RELIABILITY MODELING VIA DATA ANALYSIS

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Realistic system reliability models must include many factors of known or potential importance. Such models will contain many parameters, which should be estimated from failure data. This seldom will be feasible since there will be too few failures to provide reasonably accurate parameter estimates.

Another approach is to analyze existing data-sets, to determine reliability drivers. However, the close connection between the exponential distribution and the homogeneous Poisson process (HPP), has led to many misinterpretations of failure data. This paper concentrates on the analysis of two well known failure data-sets, or more accurately, two too well known sets-of-numbers, Proschan's (1963, 2000) aircraft air conditioner data and Davis's (1952) bus engine data. Each data-set usually has been misinterpreted as if the numbers were the failure times of nonrepairable items (parts).The practical implications of the data-sets differ drastically from the incorrect implications of the misinterpreted numbers, e.g., the first order model for the air conditioners is a superimposed HPP (i.e., an HPP), rather than a mixed exponential distribution. Moreover, some of the correct implications, which have been virtually ignored for decades, are obvious even from "eyeball analysis."

Statistical analysis of repairable systems failure data has great potential for improving our understanding of system reliability drivers. To achieve this potential, however, it is essential to consider the fundamental differences between parts and repairable systems - and hence, the corresponding differences between their probabilistic models - in analyses.

REFERENCES

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